Volunteer Lake Assessment Program Individual Lake Reports

HALFMOON LAKE, ALTON, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	4,352	**Max. Depth (m):**	8.2	**Flushing Rate (yr^{1})**	2
Surface Area (Ac.):	253	**Mean Depth (m):**	4.4	**P Retention Coef:**	0.57
Shore Length (m):	6,000	**Volume (m^{3}):**	4,545,000	**Elevation (ft):**	640

TROPHIC CLASSIFICATION

Year	Trophic class
1978	OLIGOTROPHIC
1992	MESOTROPHIC

KNOWN EXOTIC SPECIES

Variable Milfoil

The Waterbody Report Card tables are generated from the DRAFT 2014 305(b) report on the status of N.H. waters, and are based on data collected from 2004-2013. Detailed waterbody assessment and report card information can be found at www.des.nh.gov/organizations/divisions/water/wmb/swqa/index.htm

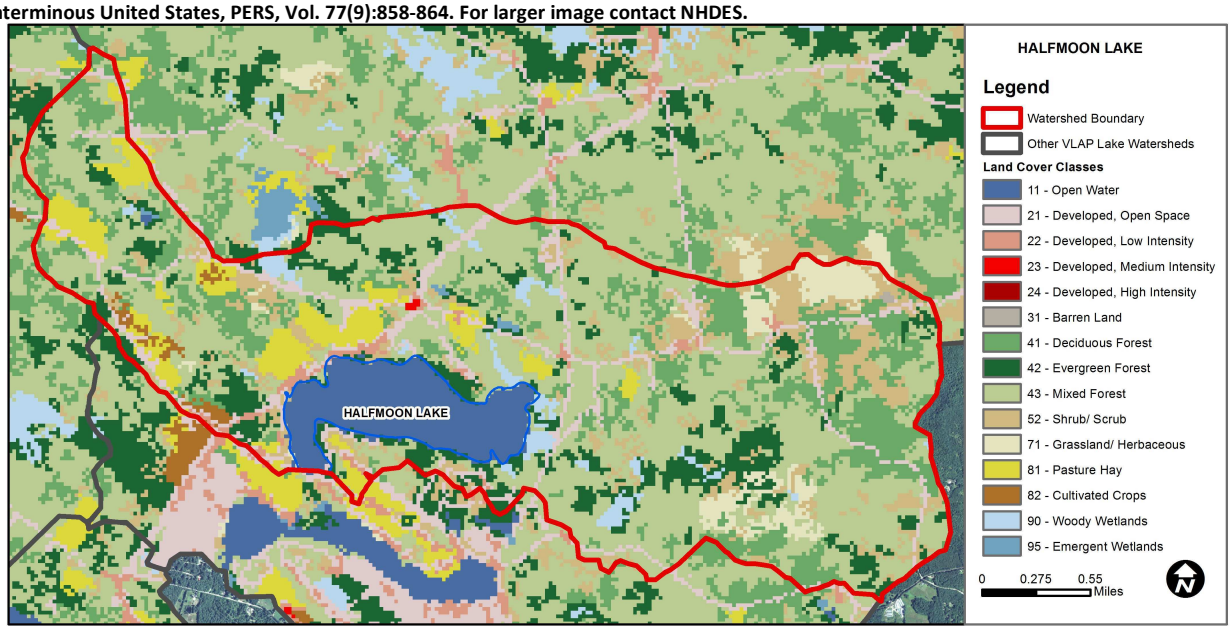
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Slightly Bad	The calculated median is from 5 or more samples and is > indicator and the chlorophyll a indicator is exceeded.
	pH	Slightly Bad	>10% of samples exceed criteria by a small margin (minimum of 2 exceedances).
	Oxygen, Dissolved	Encouraging	There are < 10 samples with 0 exceedances of criteria. More data needed.
	Dissolved oxygen satura	Slightly Bad	There are >10% of samples (minimum of 2), exceeding criteria.
	Chlorophyll-a	Slightly Bad	The calculated median is from 5 or more samples and is > indicator.
Primary Contact Recreation	Escherichia coli	Very Good	Where there are no geometric means, all bacteria samples are < 75% of the geometric mean. Where there are geometric means all single bacteria samples are < the SSMC and all geometric means are < geometric mean criteria.
	Cyanobacteria hepatoto	Slightly Bad	Cyanobacteria bloom(s).
	Chlorophyll-a	Very Good	There are a total of at least 10 samples with 0 exceedances of indicator.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

HALFMOON LAKE - CAMP MI-TE-NA BEACH	Escherichia coli	Very Good	Where there are no geometric means, all bacteria samples are < 75% of the geometric mean. Where there are geometric means all single bacteria samples are < the SSMC and all geometric means are < geometric mean criteria.

WATERSHED LAND USE SUMMARY

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.



Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	7.29	Barren Land	0.05	Grassland/Herbaceous	3.4
Developed-Open Space	6.06	Deciduous Forest	14.96	Pasture Hay	5.88
Developed-Low Intensity	1.06	Evergreen Forest	10.21	Cultivated Crops	0.67
Developed-Medium Intensity	0.05	Mixed Forest	39.34	Woody Wetlands	2.08
Developed-High Intensity	0	Shrub-Scrub	8.77	Emergent Wetlands	0.16

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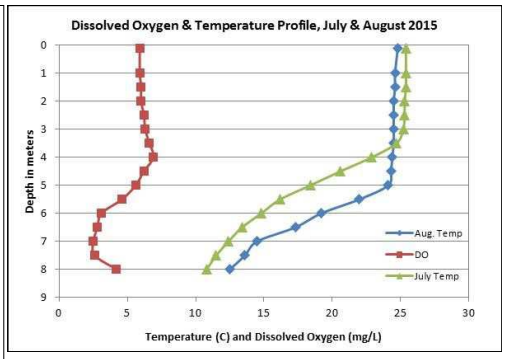
Halfmoon Lake, Barnstead

2015 Data Summary

Recommended Actions: The dry weather conditions in 2015 generally resulted in improved deep spot water quality likely the result of decreased stormwater runoff to the lake. Fern Hill Inlet phosphorus levels have been elevated since 2012. The sample station location was moved upstream for better access and flow and may indicate phosphorus pollution sources further upstream. Stream bracketing may be helpful to determine the source of elevated phosphorus levels. The increasing epilimnetic conductivity may be the result of winter road maintenance activities. Encourage local road agents and winter maintenance companies to obtain a NH Voluntary Salt Applicator License through the UNH Technology Transfer Center's Green SnowPro certification program. Educate local residents on the proper use and application of salt products on driveways and walkways. Educational materials can be found at http://www.t2.unh.edu/green-snowpro-training-and-certification. Keep up the great work!

Observations (*Refer to Table 1 and Historical Deep Spot Data Graphics)*

- **Chlorophyll-a:** Chlorophyll levels remained low in 2015, decreased as the summer progressed and were less than the state median. Historical trend analysis indicates stable chlorophyll levels since monitoring began.
- **Conductivity/Chloride:** Epilimnetic (upper water layer), Hypolimnetic (lower water layer) and Rt. 28 Inlet conductivity and chloride levels were slightly greater than the state medians and increased from 2014. Historical trend analysis indicates significantly increasing (worsening) epilimnetic conductivity since monitoring began. The dry weather conditions in 2015 may have resulted in the accumulation of salts and minerals in surface waters thereby increasing conductivity and chloride levels. Fern Hill Inlet conductivity levels remained low. Horse Farm Inlet conductivity and chloride levels were elevated and greater than the state medians likely due to winter road salt application on local roads.
- **E. coli:** Beach E. coli levels were low at all stations and much less than the state standards for public beaches and surface waters.
- **Total Phosphorus:** Epilimnetic phosphorus levels decreased as the summer progressed and were less than the state median. Historical trend analysis indicates relatively stable epilimnetic phosphorus with moderate variability between years. Hypolimnetic phosphorus levels were average and increased slightly from June to August. July Hypolimnion phosphorus levels were invalidated as they were well outside of the normal variance for this station. Rt. 28 Inlet phosphorus levels were extremely elevated in June and July and then decreased in August. Dry weather and stagnant flow conditions may have contributed to the elevated phosphorus levels as turbidities were also elevated. Fern Hill Inlet phosphorus levels were average in June and increased to elevated levels in July and August. The turbidity of the samples increased as well while stream flow likely decreased. Horse Farm Inlet phosphorus levels remained stable from June to July and increased in August but were within an average range for that station.
- **Transparency:** Transparency remained stable from June to July and then improved greatly in August making the 2015 average transparency much better than that measured in 2014 and better than the state median. Historical trend analysis indicates stable transparency since monitoring began. Transparency measured with the viewscope (VS) was generally better than that measured without (NVS) and likely a better representation of actual conditions.
- **Turbidity:** Epilimnetic turbidity was slightly elevated in June and July and then decreased to normal levels in August. Hypolimnetic turbidity increased slightly as the summer progressed but was within an average range for that station. Inlet turbidities were generally elevated on each sampling event potentially due to dry weather conditions and subsequent low flow conditions.
- **pH:** Epilimnetic and hypolimnetic pH was less than desirable range 6.5-8.0 units. Epilimnetic pH tends to fluctuate below the desirable range and historical trend analysis indicates relatively stable pH with moderate variability between years. Rt. 28 and Fern Hill Inlet pH levels were within the desirable range however Horse Farm Inlet pH levels were slightly less than desirable.



NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.
Chloride: > 230 mg/L (chronic)
E. coli: > 88 cts/100 mL – public beach
E. coli: > 406 cts/100 mL – surface waters
Turbidity: > 10 NTU above natural level
pH: between 6.5-8.0 (unless naturally occurring)

Table 1. 2015 Average Water Quality Data for HALFMOON LAKE-ALTON

Station Name	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Cond. uS/cm	E. Coli #/100ml	Total P ug/l	Trans. m		Turb. ntu	pH
							NVS	VS		
Epilimnion	6.1	3.21	10	68.6		9	4.47	4.93	1.36	6.43
Hypolimnion				68.6		15			2.13	6.06
Boys Camp					7					
Fern Hill Inlet			4	36.7		34			2.49	6.69
Hollywood Beach					7					
Horse Farm Inlet			24	125.1		28			4.76	6.35
Public Beach					5					
Rt. 28 Inlet			10	86.0		99			8.76	6.51
Rustic Shores					7					

NH Median Values: Median values for specific parameters generated from historic lake monitoring data.
Alkalinity: 4.9 mg/L
Chlorophyll-a: 4.58 mg/m^3
Conductivity: 40.0 uS/cm
Chloride: 4 mg/L
Total Phosphorus: 12 ug/L
Transparency: 3.2 m
pH: 6.6

Historical Water Quality Trend Analysis

Parameter	Trend	Explanation	Parameter	Trend	Explanation
Conductivity	Worsening	Data significantly increasing.	Chlorophyll-a	Stable	Trend not significant; data show low variability.
pH (epilimnion)	Stable	Trend not significant; data moderately variable.	Transparency	Stable	Trend not significant; data moderately variable.
			Phosphorus (epilimnion)	Stable	Trend not significant; data show low variability.